DIAdem™

Getting Started with DIAdem

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NATIONAL INSTRUMENTS™

Worldwide Technical Support and Product Information

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National Instruments Corporate Headquarters

11500 North Mopac Expressway Austin, Texas 78759-3504 USA Tel: 512 683 0100

Worldwide Offices

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About This Manual

You can use this manual to familiarize yourself with DIAdem features and how to use them. Each chapter describes a DIAdem panel.

This manual contains exercises for finding, analyzing, and presenting data, and for automating functions to process your data. The exercises do not take long, and they make it easier for you to get started with DIAdem. Each chapter concludes with a summary of the main points.

Conventions

The following conventions are used in this manual:

<>	Angle brackets indicate a key you press to perform a function, for example, <Ctrl> for the control key.
»	The » symbol leads you through nested menu items and dialog box options to a final action. The settings **Help»Examples** instruct you to open the **Help** menu and select the menu item **Examples**. DIAdem opens the ExampleFinder, where you can run examples for various DIAdem functions.
	This icon denotes a tip, which alerts you to advisory information.
	This icon denotes a note, which alerts you to important information.
bold	Bold text denotes items that you must select or click in DIAdem, such as menu items and dialog box options. Parameters are also in bold type.
italic	Italic text denotes variables, emphasis, cross-references, or an introduction to important concepts.
`monospace`	Text in this font denotes text or characters that you should enter from the keyboard, such as sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, folders, programs, subprograms, subroutines, device names, functions, operations, commands, variables, controls, events, methods, filenames and extensions, and code excerpts.

Related Documentation

For more information on DIAdem, refer to the following documentation:

- *DIAdem: Data Mining, Analysis, and Report Generation*

  This DIAdem manual explains the structure of DIAdem and how to use DIAdem to mine data, to run analyses, to create reports, and to combine all functions in a script.

- *DIAdem Help*, which you open via **Help»Contents**, or <F1>.

  The DIAdem help offers you procedures and dialog box help for each panel, as well as references to functions, commands, and variables for programmers.

- *DataFinder Server Edition: Search Engine for Technical Data*

  This manual describes how you use the DataFinder server to index data files in networks. Users connect DIAdem with a DataFinder server to search for the indexed data.

1

Introduction to DIAdem

DIAdem is the interactive National Instruments software for finding and managing technical data, for mathematically and graphically-interactively analyzing data, and for presenting the data in reports. In a uniform environment, DIAdem offers a unique combination of tools that are tailored to the requirements of technicians, engineers, and scientists. You can adjust all the tools to your tasks and automate them in scripts, thereby drastically reducing evaluation times.

The DIAdem DataFinder enables you to find test data quickly and easily, and to identify correlations in the data. To use the DataFinder you do not require a database or support from the IT-department because the DataFinder is ready for use directly after installation. You use the Chart Wizard to create and to modify your diagrams quickly and easily. You use video synchronization to evaluate videos and the respective measurement data and 3D models to project data onto the test object.

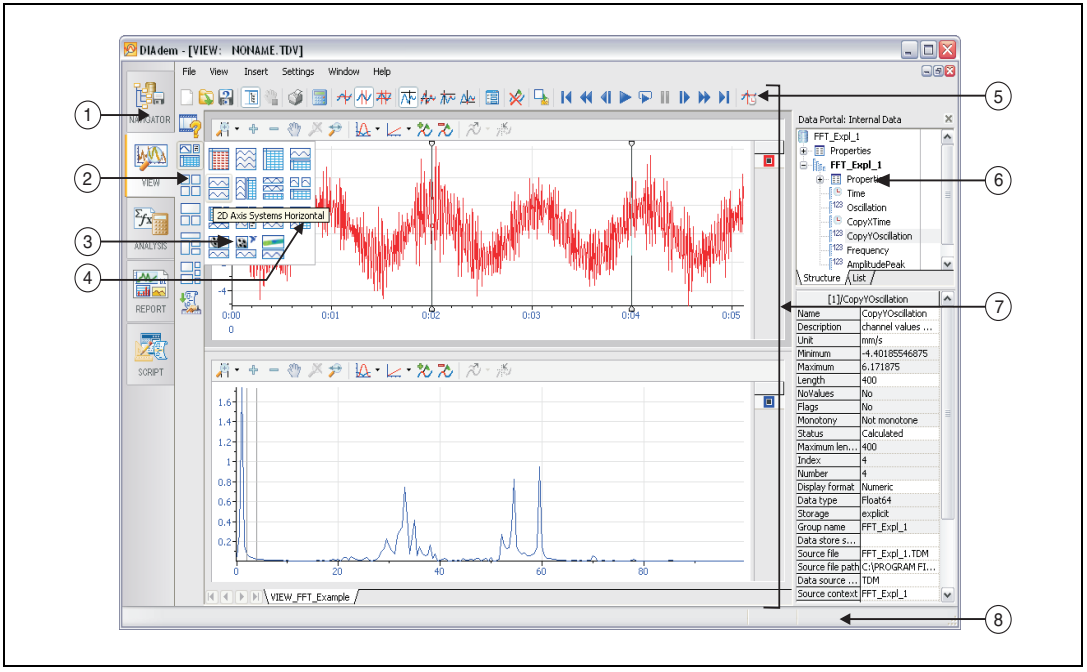
Note You have received DIAdem 11 on a DVD. If your computer does not have a DVD drive, you can download DIAdem 11 at `ni.com` or obtain a CD with DIAdem 11 from our support.

DIAdem groups functions in panels and function groups. Use the panel bar that is on the left of the DIAdem screen to switch panels. Each panel offers powerful tools that you use for the following tasks:

- Use DIAdem NAVIGATOR to find, to load, and to manage data. Use the DataFinder to search for data on your computer and in the network, and to navigate through the found data files and databases. You load the data into the Data Portal so that all DIAdem panels can work with the data, which is organized in channels.
- Use DIAdem VIEW to view, to analyze, and to edit data as curves in axis systems. In channel tables you can edit and delete the data and enter new data. You synchronize videos with data and project data onto 3D models.
- Use DIAdem ANALYSIS to analyze data mathematically. If you want to use mathematical standard functions, you select the input data and the settings. Use the Calculator to calculate your own formulas.

- Use DIAdem REPORT to document data and to present results in a report. In 2D and 3D axis systems you display your data as curves, as bar diagrams, and as surfaces and in 2D and 3D tables you list channel contents. Use comments and text to label your report and graphics to illustrate your report.
- Use DIAdem SCRIPT to automate tasks. A script combines several work steps for recurring sequences such as standard calculations and serial evaluations. A script can use functions from all DIAdem panels.

When you select a panel, DIAdem changes the user interface so that you can quickly find the functions you want. Each DIAdem panel has its own group bar to the right of the panel bar as shown in Figure 1-1. Open a group bar, click a function group, and select a function. The workspace also changes with the DIAdem panel and displays a folder hierarchy or a worksheet. The toolbars and the shortcut menus contain frequently used functions. DIAdem also adjusts the toolbars and the shortcut menus to the selected panel.



1	Panel bar	5	DIAdem VIEW toolbar
2	Group bar	6	Data Portal
3	Function group	7	DIAdem VIEW workspace
4	Tooltip for the selected function	8	Status bar

Figure 1-1. DIAdem User Interface

Using the Introduction Screen

When you launch DIAdem, the DIAdem introduction screen appears. The introduction screen shown in Figure 1-2 contains tutorials and examples that you can run, to show you how to work with DIAdem. The information on DIAdem contains tips for newcomers and advanced users and connects you to further information on the internet.

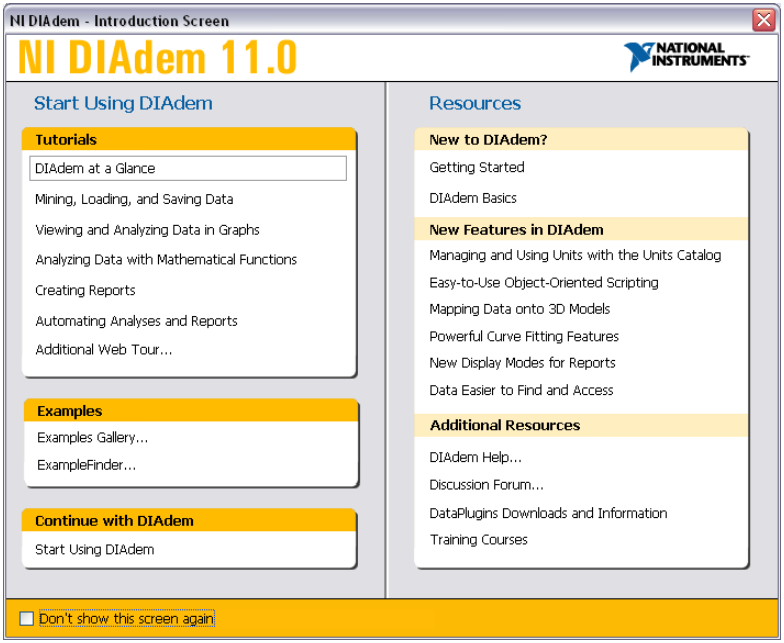


Figure 1-2. The DIAdem Introduction Screen

Note If DIAdem does not display the introduction screen when DIAdem launches, select **Help»Introduction** to open the introduction screen.

To run a tutorial, complete the following steps.

1. Click **Tutorials»DIAdem at a Glance**.

   Use the buttons on the bar at the bottom of the screen to control the tutorials.

2. Click the button shown on the left to close the tutorial window and return to the introduction screen.

Tip The DIAdem panels contain tutorials in the tutorials function group that complement the respective panel.

Finding Examples

The DIAdem Help contains examples for data analysis, for report generation, and for script generation. The examples contain simple solutions as well as extensive applications that you also can use as templates for your own applications.

Complete the following steps to automatically load and execute examples in DIAdem.

1. Click **Examples»Examples Gallery** in the introduction screen.

   DIAdem closes the introduction screen and opens the ExampleFinder with a preview of the report examples as shown in Figure 1-3.

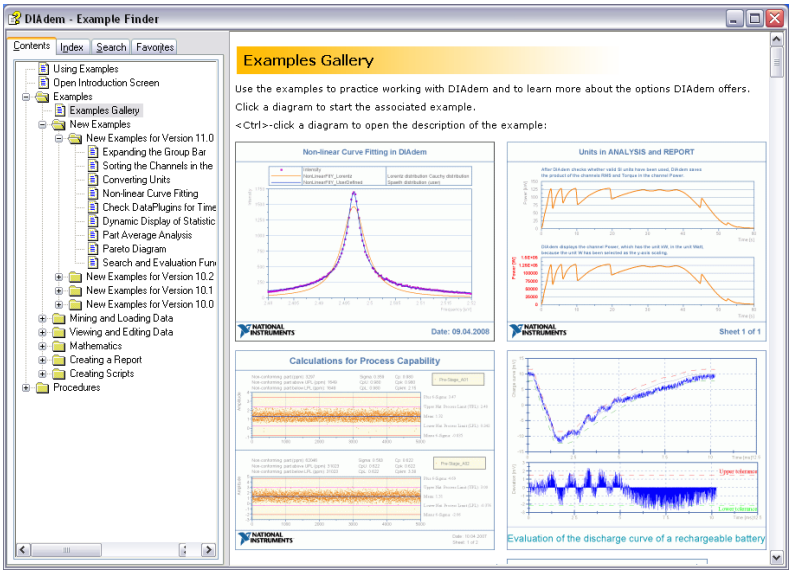


Figure 1-3. The Examples in DIAdem

2. Click the picture **Calculations for Process Capability**.

   DIAdem loads the data set and the layout of this example and displays the report.

3. Click **DIAdem ExampleFinder** on the Windows task bar to open the ExampleFinder again.

4. Navigate the ExampleFinder in the table of contents as shown in Figure 1-3 to find simple solutions as well as more extensive applications for data analysis, for report generation, and for script generation.

5. Click **Open Introduction Screen** in the table of contents.
6. Click **Continue with DIAdem»Start Using DIAdem**.

Summary

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

Tutorials

Use the tutorials in the introduction screen to learn how to use DIAdem. Select **Help»Tutorials Visible** to specify whether DIAdem displays the Tutorials function group with the tutorials that complement the respective panel, in the group bar. Refer to the DIAdem internet site `ni.com/diadem` for further videos.

Examples

Use the Example Gallery or the ExampleFinder to automatically load and execute examples for data analysis, for report generation, and for script creation and to use these examples as templates for your own applications. The table of contents for the examples also contains procedures that provide step-by-step instructions for the solution of certain tasks. Reproduce the steps of a procedure to learn how to use the described function.

New to DIAdem?

Refer to the items under this heading to open the DIAdem manuals in the introduction screen. Select **New to DIAdem?»Getting Started** to open the *Getting Started* manual on the screen. Select **DIAdem Basics** to open the user manual. The user manual contains a short introduction on how to operate DIAdem and a description of the individual panels.

Upgrading DIAdem?

Refer to the items under this heading in the introduction screen for descriptions of the most important functions of the current version. Click **More New Features** to view all new features, changes, and extensions.

Additional Resources

Refer to this heading in the introduction screen for the DIAdem Help and internet links to further information.

The **DIAdem Help** familiarizes you with DIAdem, and shows you how to use functions and to automate sequences. The DIAdem Help offers procedures and dialog box help for each panel, as well as a programming reference for creating scripts.

Click **Training Courses** to find out about the contents and the dates of upcoming DIAdem training courses. Select **DataPlugins Downloads and Information** to open the portal with the file filters available for DIAdem and to download DataPlugins. Visit the **Discussion Forum** to read the questions and answers listed or to direct your own questions to other DIAdem users.

2

Finding Data

DIAdem NAVIGATOR finds, loads, and saves your data. DIAdem works with data from files and databases. To find files you can run a quick search with separate terms or you can combine search conditions. DIAdem displays the data found, in the search results.

The file browser offers a tree view of the data that is available. If the data format allows browsing, you can browse to channel level in the folders and the files.

Mining Data

Use the **Quick Search** to search for a term if you do not know whether the property belongs to a file, a group, or a channel. Use the **Advanced Search** to combine several search conditions and to specify which properties you are searching for.

Running a Quick Search

To find data with a **Quick Search**, complete the following steps.

1. Select **DIAdem NAVIGATOR**.

   The file browser in the NAVIGATOR panel offers external data in a tree structure.

2. Enter `Weather` in the input area, to find all the data sets that contain the term `Weather`.

3. Click **Search**.

   In the quick search DIAdem does not distinguish whether the data set contains the term as the name or the property of a file, of a channel group, or of a channel. DIAdem displays all files that contain the term `Weather` or compound terms such as `Weatherdata`, as **Search Results** as shown in Figure 2-1.

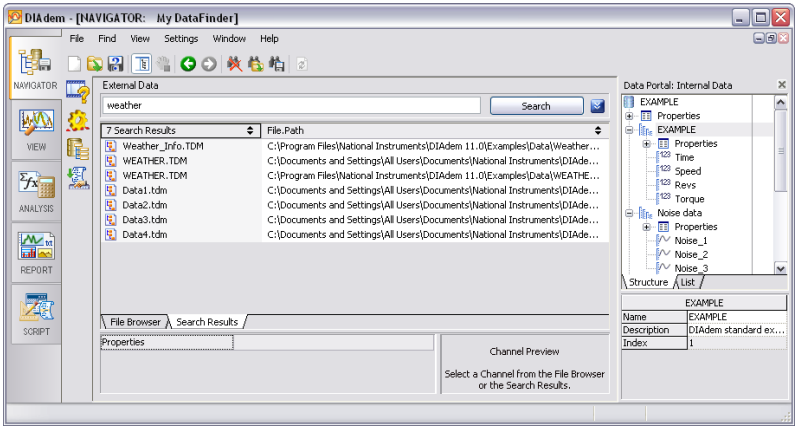


Figure 2-1. Search Results of the Quick Search

Running an Advanced Search

To find data with an **Advanced Search**, complete the following steps.

1. Click the **Advanced Search** button shown on the left to specify the search results more accurately, as shown in Figure 2-2.

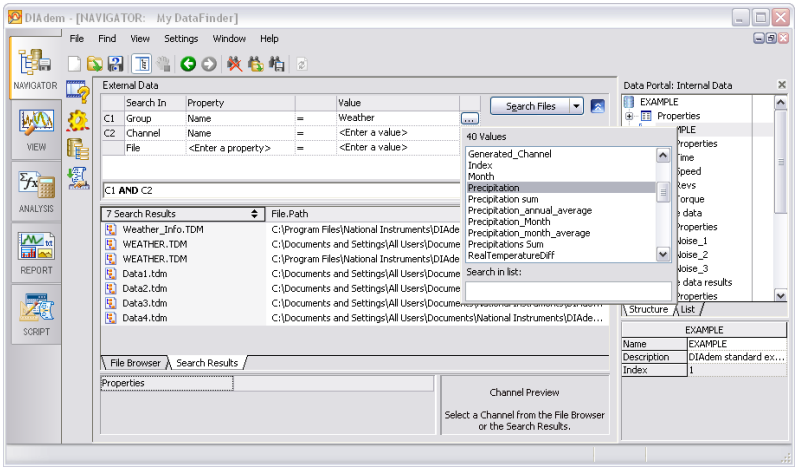


Figure 2-2. Selection List with the Channel Names of the Indexed Data

2. Click **File** in the **Search In** column and select `Group`.
   a. Click **<Enter a property>** in the **Property** column of the same row and select `Name`.
   b. Click the button with the three dots at the end of the same row. DIAdem lists the names of all the groups found, as shown in Figure 2-2.
   c. Double-click the group name `Weather`.

Note If the list does not contain the term `Weather`, DIAdem was not able to index all example files. Select **Settings»My DataFinder»Configure»Indexer»Start Now** to start indexing.

Define another search condition in the second row to specify the search more accurately.

3. Click **File** in the second row of the **Search In** column and select `Channel`.
   a. Click **<Enter a property>** in the **Property** column of the second row and select `Name`.
   b. Click the button with the three dots at the end of the second row. DIAdem lists the names of all the channels found.
   c. Double-click the channel name `Precipitation`.

   As you can see in the logical operations line under the search conditions, DIAdem connects several search conditions with the AND operator by default.
4. Replace `AND` with `OR` in the logical operations line to create the following operation:

   ```
   C1 OR C2
   ```

5. Click **Search Files**.

   DIAdem displays the **Search Results**, as shown in Figure 2-3. Each of the listed files contains a group with the name `Weather` or a channel with the name `Precipitation`.

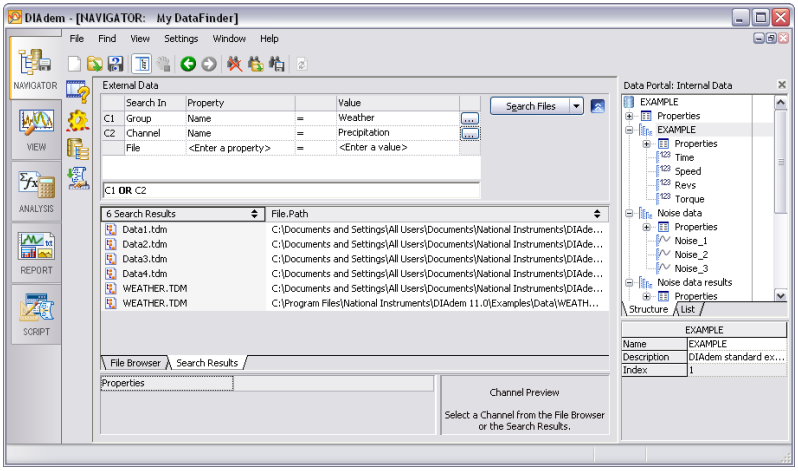


Figure 2-3. Search Results of the Advanced Search

Browsing in Data Sets

To inspect search results, you can open data files in the file browser. To open data files in the file browser, complete the following steps.

1. Right-click the `Data1.tdm` file in the search results to open the shortcut menu.
2. Select **Display in File Browser** from the shortcut menu.

   DIAdem switches from the search results to the file browser and displays the `Data1.tdm` file with the TDM file symbol in the tree structure. If the file browser knows the file formats, it displays the respective file symbol before the file. If the file browser does not know the file formats, it displays the file symbol with a question mark.

3. Click the plus sign in front of the file symbol to view the channel groups.

4. Click the plus sign in front of the `Weather` channel group to view the channels.
5. Click the `Precipitation` channel.

   DIAdem lists all the channel groups and channels that are contained in a file, in a tree structure. Refer to the **Properties** window below the **File Browser** for further information about the selected file, channel group, or channel, as shown in Figure 2-4. If you select a channel, the channel preview on the right side of the properties window displays the channel data as a curve.

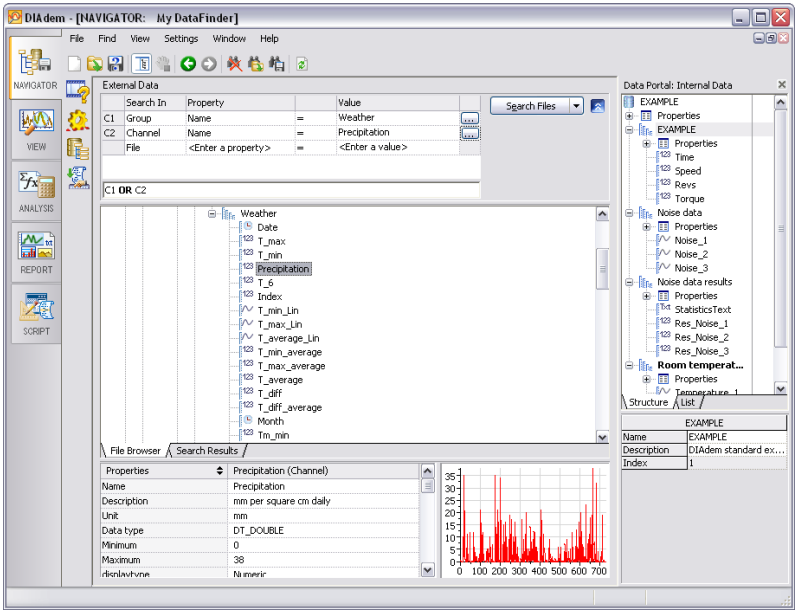


Figure 2-4. Browsing the Found Files in the File Browser

Loading and Managing Data

If you want to work with the data you have found, you must load the data into the Data Portal. To load data and to remove unnecessary data, complete the following steps.

1. Click **Delete Internal Data** on the toolbar.

2. Click the `Weather` channel group in the file browser to select this channel group.
3. Drag and drop the selected channel group into the Data Portal.

   The Data Portal displays the `Weather` channel group with all the channels, as shown in Figure 2-5.

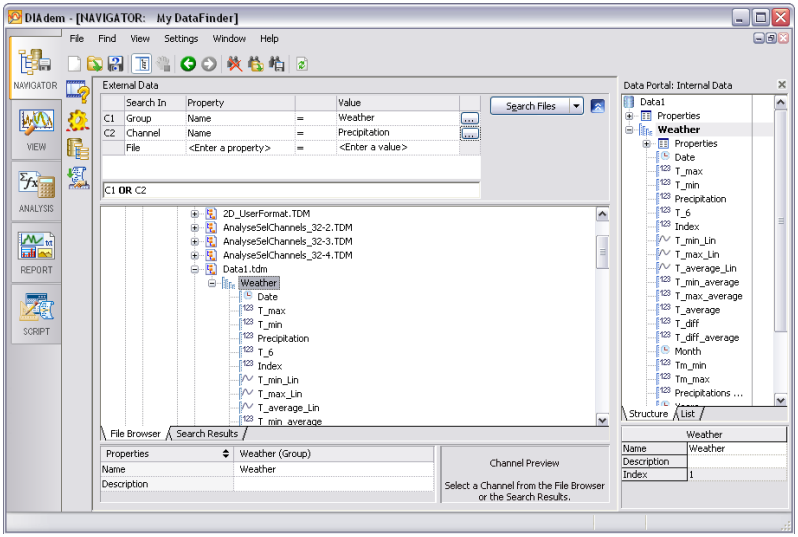


Figure 2-5. Loading Data from the File Browser to the Data Portal

Note If you modify data in the Data Portal, DIAdem does not save the changes automatically. The changes are executed only in the memory and not in the data file from which you loaded the data. This enables you to experiment with data without modifying the original data.

Saving Data

To save the data in the Data Portal, complete the following steps.

1. Click the **File Browser** tab in DIAdem NAVIGATOR.
2. Navigate to the DIAdem folder `Data` in the `National Instruments` folder.
3. Select the `Weather` channel group in the Data Portal.
4. Drag and drop `Weather` to the `Data` folder.
5. Enter the file name `Weather data` in the **Save As** dialog box.
6. Select the file type `National Instruments TDM Files (*.tdm)`.
7. Click **Save**.

Summary

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

DataFinder

In the search input area of the DataFinder you enter search conditions to help you find your data. You also can drag and drop properties from the properties window of the Data Portal or of the file browser into the search input area. In the logical operations line you connect the search conditions with AND and OR and use parentheses to specify a query more precisely. DIAdem lists the files found in the search areas on the **Search Results** tab.

DataFinder Server Edition

The DataFinder Server Edition enables up to 25 DIAdem users to access common search areas simultaneously. You also can enable security settings and use archiving systems.

Search Areas

Search areas are folders of the file system, which the DataFinder browses. Select **Settings»My DataFinder»Configure** to modify the search areas of the DataFinder.

File Browser

Use the shortcut menu of the **Search Results** to open the found data files in a tree structure in the **File Browser**. Right-click the empty space to open the shortcut menu and hide or show the folders of the local file system in a separate tree.

Internal Data in the Data Portal

DIAdem manages internal data in the Data Portal, which is visible in all panels. In the DIAdem panels you work with the channels of the internal data and their descriptive information. DIAdem saves result data in the Data Portal. You can display and edit the channel contents in DIAdem VIEW.

Tip You do not need the <Shift> or <Ctrl> keys to select several channels in the Data Portal; just click the symbols next to the channel names. DIAdem displays a cursor with a plus sign.

Channel Groups

Channel groups contain channels and descriptive properties of the channel groups. Use channel groups to organize data. You can define a channel group as a default group, for example, to automatically group all the calculation results in DIAdem ANALYSIS. DIAdem displays the group name of the default group in bold.

Channels

Channels contain data series that you measured during a test, loaded from an external data set, or calculated with DIAdem. DIAdem distinguishes numeric channels, waveform channels, time channels, and text channels. Numeric channels contain data series, waveform channels contain data series and the associated x-channel as a generation instruction, time channels contain time data series, and text channels contain text.

Properties

Properties are information about the data, which DIAdem saves with the data series in a TDM file. The data set properties contain the name of the author and the storage date, the channel group properties contain the name of the measurement and comments, and the channel properties contain the data type and the channel unit. In addition to the standard properties, you can create your own custom properties for the data set, the channel group, and the channel. DIAdem displays the properties in the properties window of the file browser and of the Data Portal.

Units Catalog

The channel unit is a special channel property because you can organize the channel units in the units catalog. Use the units catalog to assign a physical quantity and a unit to measurement values, for example, the quantity speed and the unit kilometers per hour. If you assign the unit mile per hour from the units catalog to the speed channel, DIAdem can convert the channel values.

3

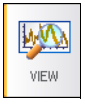
Viewing and Evaluating Data

You use DIAdem VIEW to view, to analyze, and to edit data as curves in axis systems. In channel tables you can edit and delete the data and enter new data. You synchronize videos with data and project data onto 3D models.

Viewing Curves

To view the loaded data set in an axis system, complete the following steps.

Note If you have not completed the exercise from the previous chapter, load the data set `Data1.tdm` located in the DIAdem folder `Data`. This folder is located in the DIAdem NAVIGATOR file browser in the search area **National Instruments**.



1. Select **DIAdem VIEW**.

2. Click **New Layout**.

3. Click **Regular Worksheet Partitions** on the group bar.

4. Click **Two Areas** in this function group.

Note Each panel has its own group bar on the left side. When you click a button on the group bar, DIAdem opens the function group where you can select a function.

5. Select the `Date` time channel in the Data Portal.

6. Click the symbol shown on the left before the channel name to also select the numeric channels `T_max` and `T_min`. The cursor changes its color and displays a plus sign.
7. Drag and drop the three channels selected in the Data Portal into the upper worksheet area.

8. Select **2D Axis System** in the selection dialog box.

   DIAdem displays the axis system as shown in Figure 3-1.

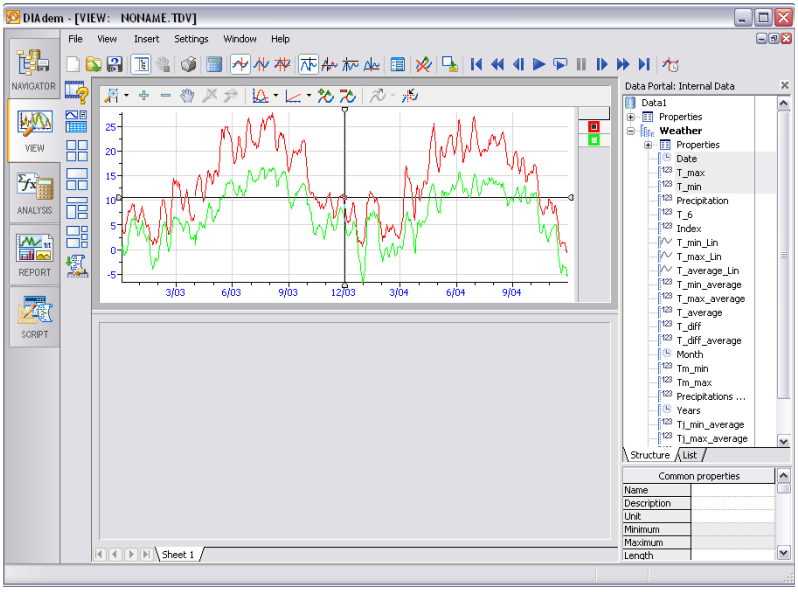


Figure 3-1. Viewing Temperature Data as Curves

Note If you select several channels in the Data Portal and drop the channels onto an axis system, DIAdem assigns the first channel you select to the x-axis. If you select only one channel, DIAdem uses the index to display a numeric channel and uses the x-part to display a waveform channel.

Zooming Curve Sections

In DIAdem VIEW you can zoom curves with the band zoom or the frame zoom from the axis system toolbar. For a close-up view of curves, complete the following steps.

1. Click **Band Zoom** on the axis system toolbar.
2. Click the axis system and drag open the band to specify the width of the curve section.
3. Click **Move** on the axis system toolbar and move the curves to the section that you want to magnify.
4. Click **Zoom In** on the axis system toolbar to increase the zoom in the selected section.

5. Click **Zoom Off** to return from the zoomed area to the complete curve.

6. Click **Move** again to disable the move mode and to reactivate the cursor.

Editing Curves

In DIAdem VIEW you can measure curves, and copy, delete, and interpolate curve sections. Use the curve cursor, the maximum values cursor, or the minimum values cursor on the DIAdem VIEW toolbar to measure a curve. To edit curve sections use the flag functions on the axis system toolbar.

Measuring Curves

To follow the curve points with the curve cursor in an axis system, complete the following steps.

1. Click **Curve Cursor** on the toolbar.
2. Click the axis system and move the curve cursor along the curve.

   DIAdem displays the x-values and the y-values of the curve points in a tooltip next to the crosshair cursor that follows the cursor.

3. Click a checkbox on the right side of the axis system to specify a different curve as the leading curve.

   DIAdem displays the coordinates of the new leading curve in the tooltip.

Copying Curve Sections

To select a curve section and to copy the data of the curve section into the Data Portal, complete the following steps.

1. Click **Band Cursor** on the toolbar.
2. Click the axis system and drag open the cursor range. Move the cursor lines to specify the width of the band cursor.
3. Click between the two lines to move the band cursor along the curves.
4. Move the band cursor to the period of time from `12.03` to `3.04`.

5. Click **Set Flags** on the axis system toolbar to mark the points of the leading curve in the selected section.

Note If you press <Shift> at the same time, DIAdem marks the points of all curves in this section.

6. Click **Flags: Copy Data Points** on the axis system toolbar to copy the data of the marked curve points to new channels.

   In the Data Portal, DIAdem creates a time channel and a numeric channel with the values of the copied curve section and selects these channels.

7. Drag and drop the selected curves into the bottom workspace.
8. Select **2D Axis System**.

   DIAdem displays the copied curve section as shown in Figure 3-2.

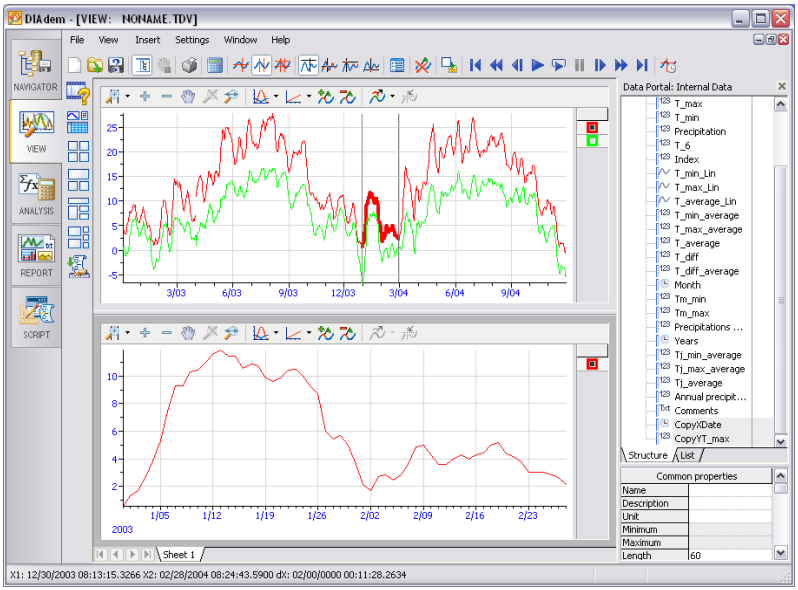


Figure 3-2. Selecting Curve Sections and Copying them in the Data Portal

9. Click **Remove Flags from All Data** on the DIAdem VIEW toolbar to undo the selections.

Editing Data in Channel Tables

In channel tables you can edit and delete data and add new data. You can enter new data manually or generate data series.

To edit values in a channel table and to generate new values complete the following steps.

1. Click **Assigned Worksheet Partitions** on the group bar.

2. Click **Channel Table** in this function group.

   DIAdem creates a new worksheet with a channel table.
3. Select the channels `Comments`, `CopyXDate`, and `CopyYT_Max` in the Data Portal.
4. Drag and drop the channels selected in the Data Portal into the channel table.

   DIAdem displays the columns of the channel table in the order in which you select the channels in the Data Portal.
5. Click the cell in the **CopyYT_max** column, row **10**.
6. Enter the value `1` and press <Enter>.

   DIAdem also displays the new value in the curve in the bottom axis system on the previous worksheet.
7. Right-click next to the channel table and select **Create New Channel** from the shortcut menu.
   a. Enter the channel name `Generated_Channel`.
   b. Click **OK** to create the new channel in the channel table and in the Data Portal.

8. Right-click the first cell of the empty column **Generated_Channel** and select **Generate** from the shortcut menu.
   a. Enter `0.5` as the step width and `100` as the number of values.
   b. Click **OK** to create the channel values.

   DIAdem displays the channel table as shown in Figure 3-3.

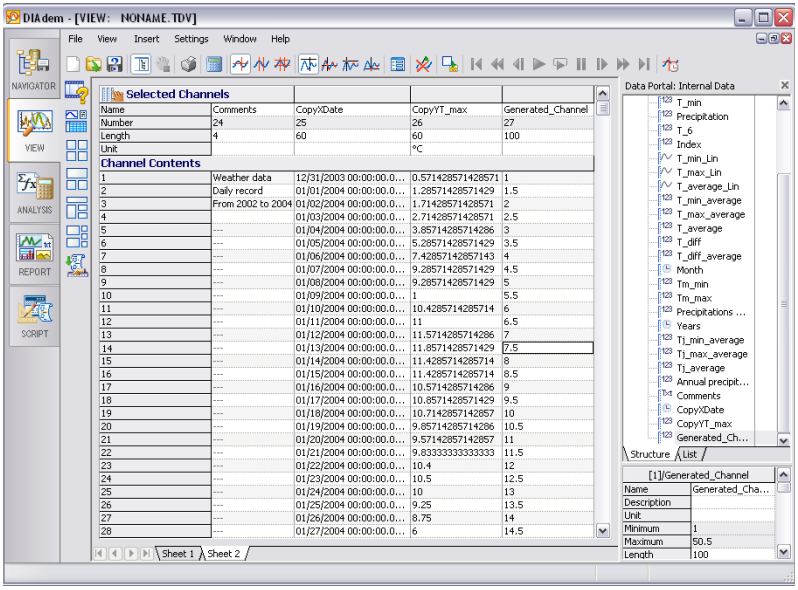


Figure 3-3. Editing and Generating Data in Channel Tables

To use the layout with all worksheets as a template for similar data sets, click **Save Layout As**.

Summary

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

Layouts

A layout can contain several worksheets. DIAdem saves layouts separately from the channels. You can reuse the layout as a template for data sets with a similar structure.

Areas

Partition worksheets into areas to insert axis systems, channel tables, videos, 3D models, text, and graphics. You can move the separating bars to resize any area in a worksheet. Use the **Assigned Worksheet Partitions** function group to add new worksheets with predefined areas to a layout.

Axis Systems

In axis systems you display data as curves, spikes, or as stair curves. To insert data into an axis system, drag and drop channels from the Data Portal into an axis system. Use the band cursor and the frame cursor to zoom curve sections. You open the legend on the right side of an axis system.

Graphics Cursors

DIAdem VIEW offers various graphics cursors for evaluating curves in axis systems. The curve cursor moves from curve point to curve point and other graphics cursors determine the minimum values and the maximum values of a curve. If an axis system contains several curves, the graphics cursor follows the leading curve that you specify with the checkboxes in the legend. DIAdem synchronizes all the cursors of a worksheet with each other and with videos and 3D models.

Flags

Use the band cursor and the frame cursor to select curve sections with flags, to delete, to copy, or to recalculate the selected curve points.

Channel Tables

In channel tables you view the individual values of the channels, edit the values of all channel types, and add new values or channels. In the display properties of a channel table you can specify whether a channel table only displays the channels that were dragged and dropped into the table or whether the channel table automatically displays all channels of a group or of the Data Portal.

Videos

In the video area you show videos. If you display the associated measured values as curves in an axis system, you can move a graphics cursor along the curves to display the frame associated with each measurement value. Double-click an empty video area to insert a video.

3D Models

In model areas you project the measured or simulated data as color shading or as deformation onto a model of the test object. For example, you display temperatures as color shading on a climate dummy or you display strain on bridge elements as deformation. To do so, you insert the 3D model of the test object and connect each data channel with the respective model point. For model points with no sensor, DIAdem interpolates the values from the data of neighboring model points.

Textboxes

You can display text and variable information in text boxes, for example, the current date. You can drag and drop properties from the Data Portal into the text box. Double-click a text box to enter text. Select **Display** from the shortcut menu to edit the appearance of the text.

Graphics

You illustrate graphics areas with graphics. Double-click a graphics area to insert a picture.

4

Analyzing Data with Mathematical Functions

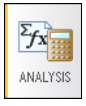
You use DIAdem ANALYSIS to analyze data mathematically. You can apply predefined standard mathematical functions, including basic mathematics, curve fitting, signal analysis, and statistics. The dialog boxes for the standard mathematical functions guide you through the calculation so you do not have to enter a formula. You select the input data and the settings. Use the DIAdem Calculator to define and calculate your own formulas.

Using Standard Mathematical Functions

DIAdem has extensive libraries of standard mathematical functions in several function groups in DIAdem ANALYSIS. The results of the calculations are displayed in new channels in the Data Portal.

Note If you have not completed the exercise from the previous chapter, load the data set `Data2.tdm` located in the DIAdem `Data` folder. This folder is located in the DIAdem NAVIGATOR file browser in the search area **National Instruments**.

To create a new group for the calculation results, complete the following steps.



1. Select **DIAdem ANALYSIS**.
2. Right-click in the Data Portal and select **New»Group** from the shortcut menu.
3. Enter `Results` as the **Name**. Enable the checkbox **Set default group**.
4. Click **OK**.

   DIAdem displays the name of the default group in bold type in the Data Portal.

Channel Values Summation

To total the precipitation for the year 2003, complete the following steps.

1. Click **Statistics** on the group bar.

2. Click **Descriptive Statistics** in this function group.
3. Select `Weather/Precipitation sum` in the Data Portal.

   This notation means the `Precipitation sum` channel is in the `Weather` channel group.
4. Drag and drop the selected channel to the **Channels** entry field in the **Object to be evaluated** area in the dialog box.
5. Enter `2-13` as the **Rows**.

Tip To check which rows the precipitation for 2003 is in, switch to DIAdem VIEW and load the channels `Month` and `Precipitation sum` into a channel table. The `Month` channel contains the time values for the monthly precipitation totals.

6. Click **All Off** to clear all the checkboxes of the characteristic values.
7. Select **Characteristic values»Sums»Measured values**. DIAdem shows the **Descriptive Statistics** dialog box as shown in Figure 4-1.

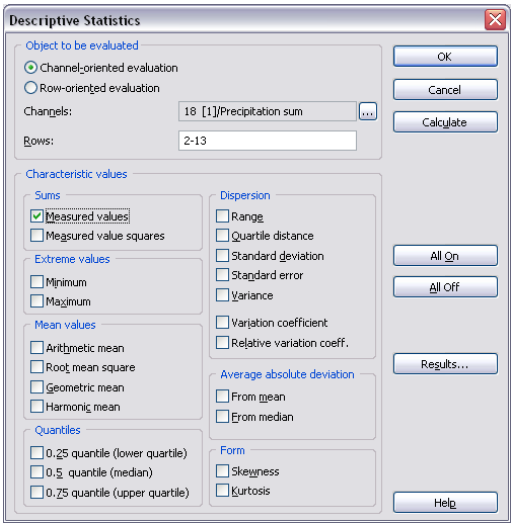


Figure 4-1. Precipitation Summation in Sections

8. Click **OK** to calculate the sum and to close the dialog box.

Note If you want to execute further calculations with this standard function, click **Calculate**. The dialog box remains open for further entries.

9. Right-click `Results/Sum` in the Data Portal and select **Rename**.
10. Enter `Precipitation_2003` as the channel name and press <Enter>.

Averaging Channels

To calculate the average monthly temperatures, complete the following steps.

1. Click **Channel Functions** on the group bar.
2. Click **Average Channel** in this function group.
3. Select `Weather/Tm_min` in the Data Portal.
4. Press <Ctrl> and also select `Weather/Tm_max`.
5. Drag and drop the selected channels into the **Channels to be averaged** field in the **Average Channels** dialog box.

   DIAdem displays the dialog box as shown in Figure 4-2.

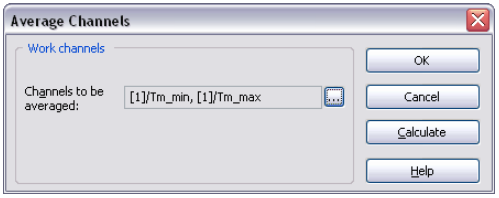


Figure 4-2. Averaging Minimum and Maximum Temperatures

6. Click **OK**.
7. Right-click `Results/Mean` in the Data Portal and select **Rename**.
8. Enter `Temperatures` as the channel name and press <Enter>.

Calculating with the Units Catalog

The DIAdem units catalog organizes physical quantities and the associated units. Use the units catalog to convert channels into other units.

To convert the calculated average monthly temperature from degrees Celsius to degrees Fahrenheit, complete the following steps.

1. Click **Channel Functions** on the group bar.
2. Click **Convert Channel Unit** in this function group.
3. Select `Results/Temperatures` in the Data Portal.
4. Drag and drop the selected channel to the **Channels** entry field in the **Channel to be calculated** area in the dialog box.
5. Select in the **Unit** area the **Unit set** `<All units>`.
6. Select under **To** the setting `[°F] degree Fahrenheit` as shown in Figure 4-3.

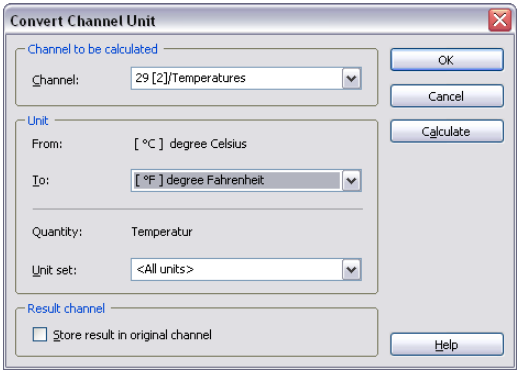


Figure 4-3. Converting Channel Units with the Units Catalog

7. Click **OK**.
8. Right-click `Results/UnitConverted` in the Data Portal and select **Rename**.

9. Enter `Temperatures_F` as the channel name and press <Enter>.

Note You also can convert channel data to a different unit in the Data Portal. To do so, click the unit entry field in the properties window and click the button with the three dots to open the **Symbol Input Help** dialog box.

DIAdem ANALYSIS displays a record of the calculations as shown in Figure 4-4, and the Data Portal contains the calculation results in new channels.

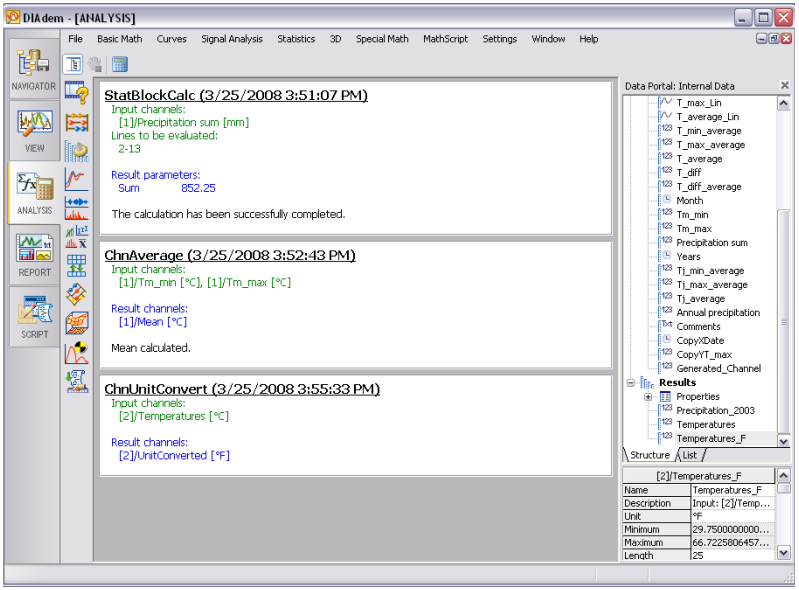


Figure 4-4. Record of the Calculations with Standard Functions

Refer to Figure 5-3 in the next chapter to view the curves of the average temperatures and the annual precipitation.

Calculating Formulas with the Calculator

Use the DIAdem Calculator to mathematically analyze data with your own formulas. Use the Calculator to calculate channels, variables, and input values. DIAdem stores the results in channels or variables.

To calculate the difference between the monthly maximum temperatures and the average temperatures, complete the following steps.

1. Click the **Calculator** on the toolbar.
2. Enter the following formula in the Calculator entry field.

```
Ch("Results/TmMax_Diff")=Ch("[1]/Tm_max")-Ch("[2]/Temperatures")
```

   To insert the output channels in the formula, open the **Channels** tab and double-click a channel. DIAdem inserts the channel name with the group index at the cursor position. DIAdem displays the Calculator as shown in Figure 4-5.

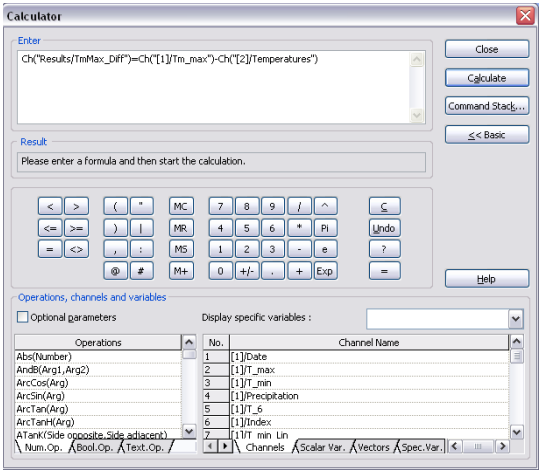


Figure 4-5. Calculating Formulas with the Calculator

3. Click **Calculate**.
4. Click **Close**.

   DIAdem adds the new channel `TmMax_Diff` to the `Results` channel group in the Data Portal.

Summary

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

Mathematical Functions

DIAdem ANALYSIS offers a variety of standard functions for analyzing your data. You assign input channels to standard functions, set parameters, and execute the calculation. Click **OK** to execute a calculation once and to close the dialog box. Click **Calculate** to execute several calculations with one standard function.

Result Channels

DIAdem ANALYSIS saves calculation results in new channels. This enables you to calculate new data without overwriting the existing channels. In most dialog boxes of the standard functions you can select **Store result in original channel** to overwrite the existing channels.

Default Group

DIAdem stores the result channels of a calculation in the default group in the Data Portal. Use the shortcut menu to change the default group in order to specify where DIAdem saves calculation results. DIAdem displays the group name of the default group in bold type.

Calculator

Use the Calculator to specify your own formulas for analyzing data. The Calculator has functions that range from simple arithmetic functions to advanced scientific and engineering functions. Use the Calculator to calculate channels, variables, and single values. DIAdem stores the results in channels or variables.

Units

If you assign units from the units catalog to the original channels, DIAdem automatically specifies the unit of the result channels. Based on the physical quantities and units of the original channels dividing distance by time results in a speed with the unit kilometers per hour, for example. Select **Settings»Options»Units** to add your own units and to define unit sets with favorite units.

5

Creating Reports

You use DIAdem REPORT to create multi-page reports of data and results. You use two-dimensional and three-dimensional axis systems, tables, polar axis systems, text, variables, and graphics to document and to present data. You use the Chart Wizard to create and to modify 2D axis systems and polar axis systems.

Creating Axis Systems

To create a new layout with the Chart Wizard, complete the following steps.

Note If you have not completed the exercise from the previous chapter, load the data set `Data3.tdm` located in the DIAdem `Data` folder. This folder is located in the DIAdem NAVIGATOR file browser in the search area **National Instruments**.

1. Select **DIAdem REPORT**.

2. Click **New Layout**.
3. Select the channels `Weather/Month`, `Weather/Precipitation sum`, and `Results/Temperatures`.
4. Right-click the selected channels and select **Chart Wizard** from the shortcut menu.

   DIAdem opens the Chart Wizard and creates a new worksheet with an axis system. In the axis system, DIAdem displays the channels that are selected in the Data Portal as curves as shown in Figure 5-1. DIAdem assigns the first selected channel to the x-axis.

   In Step 1 you select the diagram type. In Step 2 you add or delete curves. In Step 3 you specify the diagram display on several tabs. The preview as shown in Figure 5-1 directly displays how the diagram changes.

5. Click the diagram type **Lines with Several Y-Axes**.

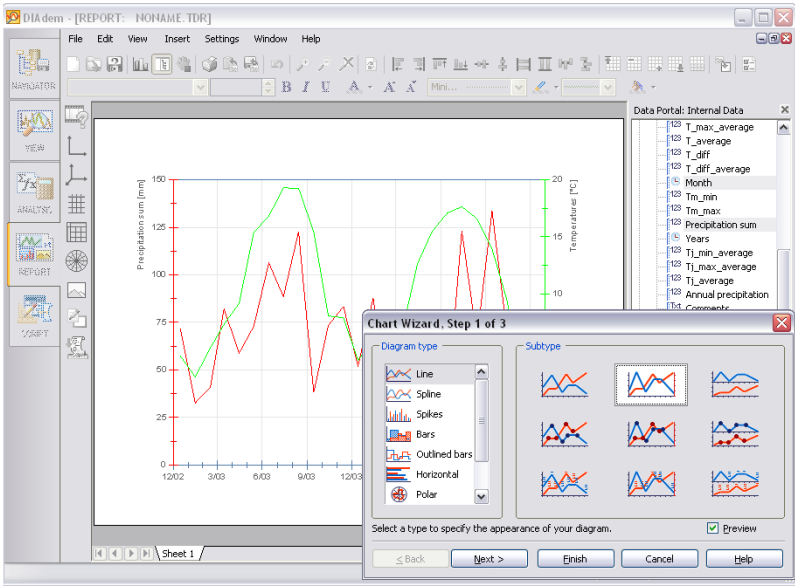


Figure 5-1. The Chart Wizard Displays the Preview in the Worksheet

6. Click **Next** twice to open Step 3 of 3.
7. Select the **X-Axis** tab.
8. Enable **Manual from** for the value range and enter `01/01/2003` as the start and `12/31/2003` as the end.
9. Click **Finish** to create the axis system.

   In the axis system, DIAdem displays the monthly precipitation and the monthly average temperatures over the date.

Tip You can open the Chart Wizard at several points in DIAdem. If you want to display curves with various x-channels, open the Chart Wizard on the toolbar. If you want to integrate axis systems into the current worksheet, open the Chart Wizard from the **2D Axis Systems** function group or the **Polar Axis Systems** function group. If you want to edit an axis system, open the Chart Wizard from the shortcut menu of the axis system.

Editing Axis Systems

You can move and resize axis systems or parts of an axis system. To make it easier for you to see which objects you can select, DIAdem displays an object in a blue frame as soon as the mouse cursor idles on the object. Double-click the object to open the settings.

1. To reduce the width of the axis system move the small square in the middle of the right edge of the selected axis system to the left.
2. Double-click the axis system to open the curve and axis definition.

3. Click the entry field **Type** in the first line of the curve `Month/Precipitation sum`.

4. Select the **Display mode** `Bars`.
5. Click **OK** twice to close the dialog box for the curve parameters and the dialog box for the curve and axis definition.

   DIAdem displays the worksheet as shown in Figure 5-2.

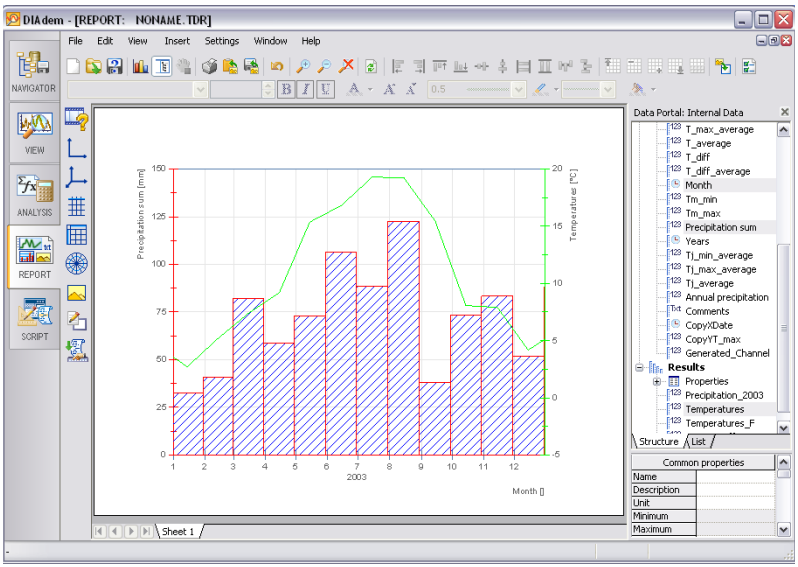


Figure 5-2. DIAdem Displays the Precipitation as Bars

Graphics and Lines

Illustrate reports with graphics and company logos. Use lines and rectangles to divide the worksheet or to highlight a text field. To add a graphic to your worksheet, complete the following steps.

1. Click **Graphics** on the group bar.

2. Click **Load Graphic** in this function group.
3. Select `Weather.jpg` in the DIAdem `Documents` folder and click **Open**.
4. Click and drag the graphic to the right edge of the workspace. Resize the graphic by dragging the small squares at the corners of the graphic.

To prepare a text field on the right of the worksheet, complete the following steps.

1. Click **Decorations** on the group bar.

2. Click **Rectangle** in this function group. A small rectangle appears next to the cursor.
3. Drag open a lamellar frame from the top of the worksheet to the bottom right corner of the worksheet and separate the text field from the axis system.
4. Double-click the rectangle and enter for **X2** and for **Y2** `100` on the **Position** tab.
5. Click **OK**.

   The rectangle is now flush with the frame of the worksheet as shown in Figure 5-3.

Using Text and Variables as Labels

Add text and variables to a report to highlight the contents and specific items. All texts can include formula expressions and DIAdem variables, which DIAdem updates along with the rest of the report. Double @ characters indicate to DIAdem which parts of the text to evaluate dynamically. To add a text to your report, complete the following steps.

1. Click **Decorations** on the group bar.

2. Click **Text** in this function group. The cursor changes to a text cursor.
3. Click the text field header in the worksheet, where you want to enter a heading.
4. Enter the text `Weather report` and press <Enter>.
5. Enter `@@CurrDate@@` in the second line.
6. Click outside the text to conclude the entry.
7. Click the text. To resize the text, drag the small squares at the corners of the text with your mouse cursor.

Adding and Formatting Channel Properties

You can drag and drop channel properties from the Data Portal into the worksheet. Click the button with the three dots at the end of the entry field in the text editor dialog box to access further variables and expressions. To add a channel property to your report and to edit the channel property, complete the following steps.

1. Select `Results/Precipitation_2003` in the Data Portal.
2. Click **Minimum** in the properties window of the Data Portal and drag the channel property into the text field.
3. Double-click the inserted text. The text editor displays the following text:

```
Minimum: @@Str(Data.GetChannel("[2]/Precipitation_2003").
  Properties("minimum").Value, "AutoAdj")@@
```

   a. Replace the first word `Minimum:` with the description `Annual precipitation`.
   b. Press <Enter> to position the value below the text.
   c. Enter `mm` at the end of the text.

4. Click the **Position** tab and select `Centered` as the **Relative position**.
5. Click **OK**.

6. Select all texts and the graphic and click **Center Vertically** on the toolbar.

   DIAdem displays the worksheet as shown in Figure 5-3.

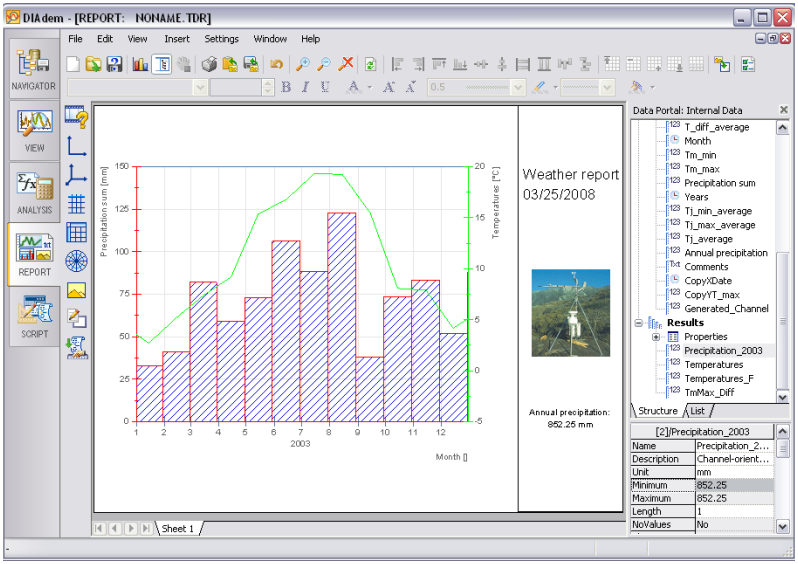


Figure 5-3. Using Text and Variables as Labels

To use the layout with all worksheets as a template for similar data sets, click **Save Layout As**.

Summary

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

Layouts

A layout can contain several worksheets. DIAdem saves layouts separately from the channels. You can reuse layouts as templates for data sets with a similar structure.

Worksheets

Worksheets contain axis systems, text, tables, and graphics. To add data to the worksheet, drag and drop channels from the Data Portal into axis systems and tables. In addition to selecting data channels from the Data Portal, you also can add data channels by double-clicking an axis system or a table.

Select **Settings»Layout Setup»Worksheet Parameters**, for example, to change the page format of the worksheet from horizontal to vertical.

Master Layout

Use a master layout to create a uniform appearance for reports. The master layout remains unchanged in the background of all worksheets and consists of a landscape master and a portrait master. To create a master layout, select **File»Master Layout»New**.

Chart Wizard

You can use the Chart Wizard to create and to modify 2D axis systems and polar axis systems. The preview function displays each changed setting in the worksheet.

Axis Systems

Use axis systems to display channels as curves, bars, and surfaces. You double-click an axis system to edit the displayed curves, to add new curves, and to delete existing curves.

Tables

Use tables to list channel contents. You double-click a table to edit the displayed columns, to add new columns, and to delete existing columns.

Text

Use text to label worksheets. Text also can include variable information such as filenames or the current date. For DIAdem, the `@@` characters indicate a variable expression. Click **Refresh** on the DIAdem REPORT toolbar to display the current variable contents.

Decorations

Use comments, lines, arrows, rectangles, and circles in a worksheet to highlight certain areas or curve points.

Graphics

Use graphics and logos to illustrate worksheets. DIAdem supports a number of different graphic formats including PNG, BMP, JPG, TIF, and WMF.

Format Bar

Use the format bar below the toolbar to format report objects. The format bar always displays the properties that all selected objects have in common, for example, line width, line style, and line color for selected curves.

6

Automating Sequences

With DIAdem SCRIPT you can create scripts to automate sequences in DIAdem. The recording mode lists all the actions that you complete interactively in DIAdem, in a script. You can add program structures and dialog boxes to recorded scripts in the integrated script editor.

Creating Scripts

The recording mode is the easiest way to create scripts. When you enable the recording mode, DIAdem creates a new script in the script editor and records the steps you make in this script. To create a new script in recording mode, complete the following steps.

1. Select **DIAdem SCRIPT**.

2. Click **Enable Recording Mode** on the toolbar to start recording the script.
3. Enter `DIAdem user` as the **Author** and `Manual example` as the **Comment** as shown in Figure 6-1.

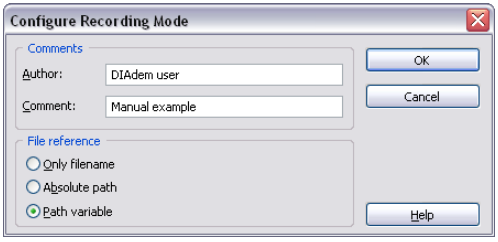


Figure 6-1. Configuring the Recording Mode

DIAdem writes this information directly into the script code to help you identify the script in the future.

4. Click **OK**.

   The status bar displays the recording mode symbol.

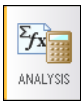
5. Select **DIAdem NAVIGATOR**.

6. Click **Delete Internal Data** to delete the data in the Data Portal.
7. Enter `Weather` in the search input area of the quick search.
8. Press <Ctrl-A> to insert DIAdem instructions in the script for the search.

   DIAdem inserts several lines in the recorded script. Before you use the script, you must edit these lines.

Note If you do not press <Ctrl-A>, DIAdem does not record the instructions for the search.

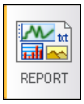
9. Click **Search**.
10. Drag and drop the `Data1.tdm` file into the Data Portal.



11. Select **DIAdem ANALYSIS**.

12. Click **Channel Functions** on the group bar.

13. Click **Average Channel** in this function group.
14. Select the channels `Weather/Tm_min` and `Weather/Tm_max` in the Data Portal.
15. Drag and drop the selected channels into the **Channels to be averaged** field in the **Average Channels** dialog box.
16. Click **OK**.



17. Select **DIAdem REPORT**.

18. Click **Load Layout**.
19. Select the layout `Report2.tdr` and click **Open**.

    DIAdem automatically refreshes the display to show the data set you have just loaded.

20. Select **DIAdem SCRIPT**.

21. Click **Disable Recording Mode**.

    DIAdem displays the recorded script in the script editor as shown in Figure 6-2.

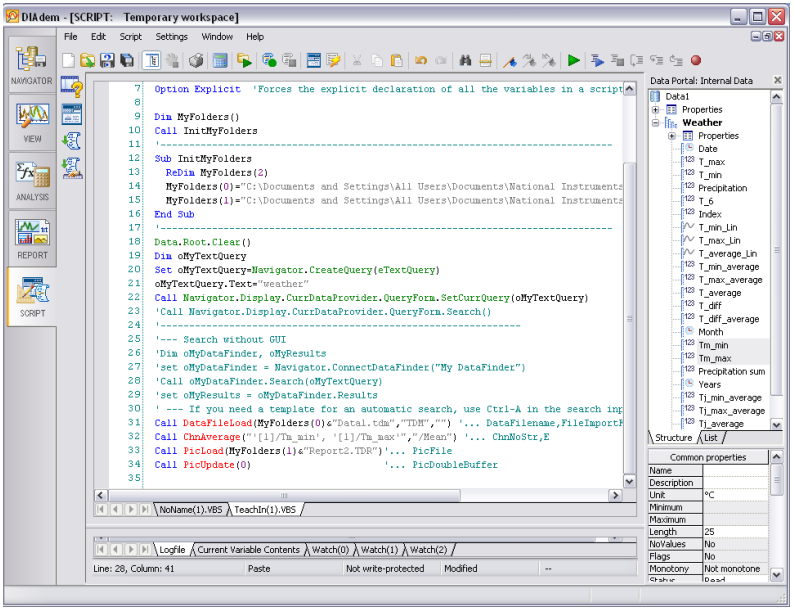


Figure 6-2. Recording Actions in the Script Editor

After the commenting header, DIAdem declares the `MyFolders` path variable and assigns to this variable the paths to the data folder and to the document folder. If you want the script to load the data file or the report file from another folder, just change the paths at this point in the script.

Editing Scripts

In the recording mode you pressed <Ctrl-A> to record the search for the weather data. DIAdem has inserted parts of these lines as comments, to allow a search with or without the DIAdem NAVIGATOR interface.

To allow interactive data selection in the script, complete the following steps.

1. Delete the quotation mark at the beginning of the following script line with <Ctrl-Shift-'> to convert the comment into a command. The command configures the query in the DIAdem NAVIGATOR interface and lists the channels of the channel groups found, on the **Search Results** tab.

```
Call Navigator.Display.CurrDataProvider.QueryForm.Search()
```

2. Replace the script line for loading the data file `Data1.tdm`

```
Call DataFileLoad(MyFolders(0)&"Data1.tdm","TDM","")
```

   with the following script lines:

```
Call WndShow ("NAVIGATOR","Open")
Call InteractionOn
```

   The first script line opens the NAVIGATOR panel and the second line stops the script so that you can load data interactively.

3. Use the CodeCompletion function to enter the statement for hiding the DataPortal behind the last script line:

   a. Enter `Portal.`

      As soon as you enter the dot behind the `Portal` object, DIAdem offers the methods and properties available for this object, as shown in Figure 6-3.

   b. Double-click `Visible` to insert this property into the script.

   c. Complete the script line as follows:

```
Portal.Visible = False
```

4. Enter the command `Keywait` in the script line as shown in Figure 6-3.

   Select `Keywait` and press <F1> to open the Help for this command.

5. Enter the following script line to redisplay the Data Portal at the end.

```
Portal.Visible = True
```

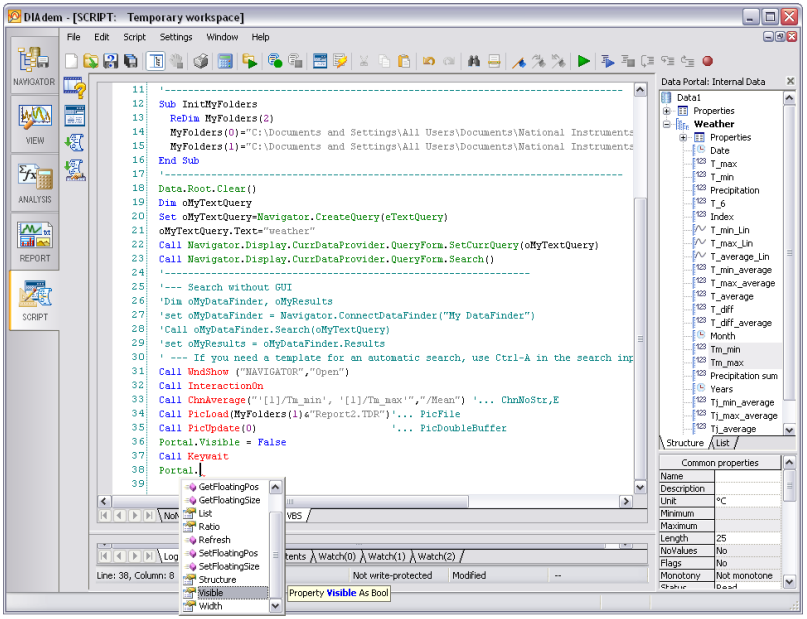


Figure 6-3. CodeCompletion Makes Editing Objects Easier

Testing Scripts

To test the modified script, complete the following steps.

1. Click **Run Script**.

   The script opens the NAVIGATOR panel and displays in the **Search Results** all the data files that contain the term `Weather`.

2. Click the file symbol in front of the `Data4.tdm` file to select the file.
3. Drag and drop the selected file into the Data Portal.

4. Click **End Interaction** on the toolbar.

   The script opens the REPORT panel. DIAdem refreshes the date displayed in the header and hides the Data Portal as shown in Figure 6-4.

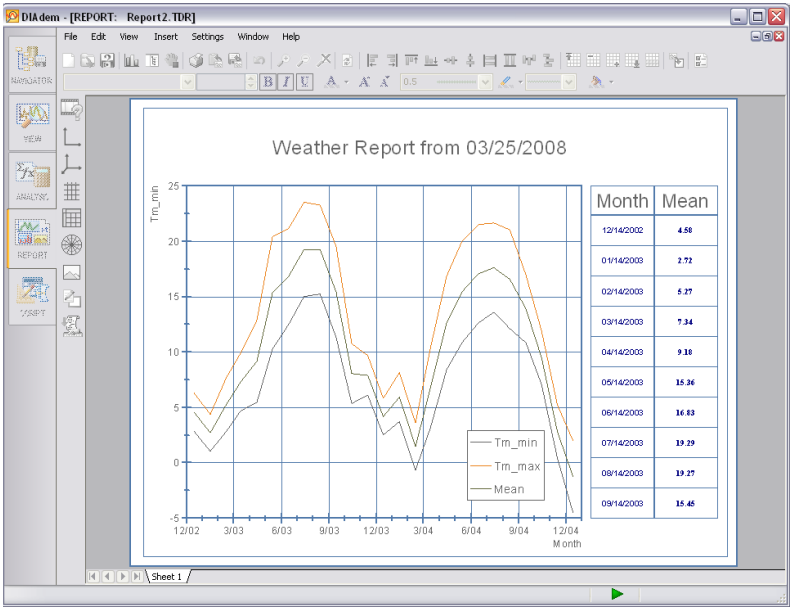


Figure 6-4. Report Created with the Script

5. Press a key to redisplay the Data Portal and to end the script.

Select **DIAdem SCRIPT** and click **Save File As** to save the script.

Summary

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

Scripts

Scripts allow you to execute a series of commands for finding data, loading data, analyzing data, and creating reports. You can use VBS syntax and DIAdem commands in scripts. You can integrate the standard dialog boxes in scripts or you can create your own dialog boxes.

Recording Scripts

In the recording mode DIAdem records the command for every action that you execute interactively, in a script.

<Ctrl-A>

In recording mode, DIAdem does not usually record the value assignment for program variables. For example, press <Ctrl-A> in a DIAdem REPORT dialog box to record the values of the program variables. If DIAdem is not in recording mode, copy the value assignments of the program variable with <Ctrl-A> to the Windows clipboard and then add these assignments to a script.

Script Editor

The script editor displays the program code of scripts. While you record actions in the recording mode, DIAdem records the commands directly in the script editor. Use functions such as line enumeration, jump statements, bookmarks, restoring, and find and replace, to make script editing easier. Use the Microsoft Windows Script Debugger in the script editor to work through scripts step by step and to find errors.

If you click a command or a variable, the tooltip displays the parameters of the command or the value range of the variable. Press <F1> to call the Help page of the command or the variable.

CodeCompletion

If you enter the name of an object and complete the entry with a dot, the script editor offers the subobjects, events, properties, and methods that are available for this object. Add your selection to the object with a double-click.

Interaction Mode

When you use the interaction mode, you can stop your script to work interactively with DIAdem. You enable the interaction mode in scripts with the `InterActionOn` command. To end the interaction mode, click the **End Interaction** button, which is on the toolbar in all panels.

User Commands

To add commands to DIAdem, you can define user commands in a script. You use these user commands, for example, in Calculator formulas, for axis system formats in DIAdem REPORT, and as new commands in DIAdem SCRIPT.

User Dialog Boxes

Create user dialog boxes in the dialog editor in DIAdem SCRIPT to enter values, to request settings, or to start functions. Use events to connect elements from user dialog boxes and specify how the script proceeds in relation to the previously specified settings.

A

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